JY997D14901E Side B

MITSUBISHI ELECTRIC

Side A JAPANESE

Side B ENGLISH

PROGRAMMABLE CONTROLLERS
MELSEC-F

FX3UC-4AD

INSTALLATION MANUAL

FX3UC

Manual Number	JY997D14901
Revision	E
Date	April 2015

This manual describes the part names, dimensions, mounting, and specifications of the product. Before use, read this manual and the manuals of all relevant products fully to acquire proficiency in handling and operating the product. Make sure to learn all the product information, safety information, and precautions.
Store this manual in a safe place so that it can be taken out and read whenever necessary. Always forward it to the end user.
Registration:
The company and product names described in this manual are registered trademarks or the trademarks of their respective companies.

Effective April 2015
Specifications are subject to change without notice.

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Safety Precaution (Read these precautions before use.)

This manual classifies the safety precautions into two categories:

⚠WARNING and ⚠CAUTION .

⚠WARNING	Indicates that incorrect handling may cause hazardous conditions, resulting in death or severe injury.
⚠CAUTION	Indicates that incorrect handling may cause hazardous conditions, resulting in medium or slight personal injury or physical damage.

Depending on the circumstances, procedures indicated by ⚠CAUTION may also cause severe injury.
It is important to follow all precautions for personal safety.

Associated Manuals

Manual name	Manual No.	Description
FX3S/FX3G/FX3GC/ FX3U/FX3UC Series User's Manual - Analog Control Edition	JY997D16701 MODEL CODE: 09R619	Describes specifications for analog control and programming method for FX3S/FX3G/FX3GC/FX3U/ FX3UC Series PLC.
FX3S/FX3G/FX3GC/ FX3U/FX3UC Series Programming Manual - Basic & Applied Instruction Edition	JY997D16601 MODEL CODE: 09R517	Describes PLC programming for basic/applied instructions and devices.
FX3UC Series User's Manual - Hardware Edition	JY997D28701 MODEL CODE: 09R519	Explains the FX3UC Series PLC specifications for I/O, wiring, installation, and maintenance.

How to obtain manuals
For product manuals or documents, consult with the Mitsubishi Electric dealer from who you purchased your product.

Certification of UL, cUL standards

The following product has UL and cUL certification.
UL, cUL File Number:E95239
Models: MELSEC FX3UC series manufactured
FX3UC-4AD

Compliance with EC directive (CE Marking)

This note does not guarantee that an entire mechanical module produced in accordance with the contents of this note will comply with the following standards. Compliance to EC directive and LVD directive for the entire mechanical module should be checked by the user / manufacturer. For more details please contact the local Mitsubishi Electric sales site.

Requirement for Compliance with EMC directive

The following products have shown compliance through direct testing (of the identified standards below) and design analysis (through the creation of a technical construction file) to the European Directive for Electromagnetic Compatibility (2004/108/EC) when used as directed by the appropriate documentation.

Attention
- This product is designed for use in industrial applications.

Note
- Authorized Representative in the European Community:
  Mitsubishi Electric Europe B.V.
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Type: Programmable Controller (Open Type Equipment)
Models: MELSEC FX3UC series manufactured
from October 1st, 2007 FX3UC-4AD

Standard	Remark
EN61131-2:2007 Programmable controllers - Equipment requirements and tests	Compliance with all relevant aspects of the standard. **EMI** • Radiated Emissions • Mains Terminal Voltage Emissions **EMS** • RF immunity • Fast Transients • ESD • Surge • Conducted • Power magnetic fields

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The FX3UC-4AD have been found to be compliant to the European standards in the aforesaid manual and directive. However, for the very best performance from what are in fact delicate measuring and controlled output device Mitsubishi Electric would like to make the following points;
As analog devices are sensitive by nature, their use should be considered carefully. For users of proprietary cables (integral with sensors or actuators), these users should follow those manufacturers installation requirements.
Mitsubishi Electric recommend that shielded cables should be used. If NO other EMC protection is provided, then users may experience temporary loss or accuracy between ±10% in very heavy industrial areas.
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- Sensitive analog cable should not be laid in the same trunking or cable conduit as high voltage cabling. Where possible users should run analog cables separately.
- Good cable shielding should be used. Ground the shield of the twisted shielded cable at one point on the PLC side.
- When reading analog values, EMC accuracy can be improved out by averaging the readings. This can be achieved either through functions on the special function block for analog input or through a users program in the FX3UC Series PLC main unit.
- Please use FX3UC-4AD while installed in a shielded enclosure. For the details, refer to the following manual.
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Note for compliance with EN61131-2:2007
General note on the use of the power supply cable.
The FX3UC-4AD unit requires that the cable used for power supply is 30m or less.

1. Outline

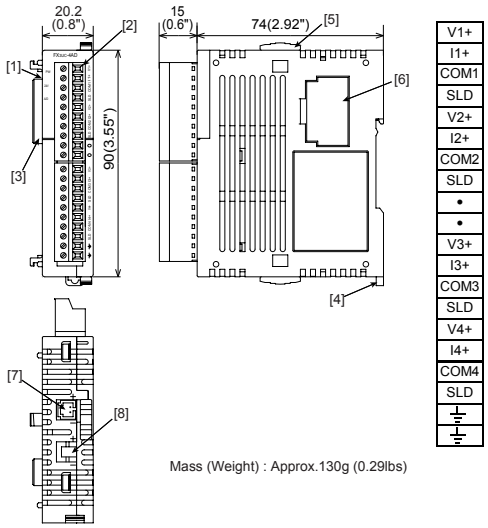
The FX3UC-4AD special function block for analog input converts four analog input values (voltage, current) to digital values and transfers those digital values to the PLC main unit. For the purpose of this manual the FX3UC-4AD will from here be referred to as the 4AD.

2. Incorporated Items

Verify that the following product and items are included in the package:

Product Manual Special unit/block No.label FX2NC-10BPCB1 (Power crossover cable)

3. External Dimensions, Part Names, and Terminal Layout



Mass (Weight) : Approx.130g (0.29lbs)

[1] Status indicator LED
- PW (Green): Lit while 5 V power is normally supplied from PLC.
- 24V (Red): Lit while 24V power is normally supplied from power supply.
- A/D (Red): Flashes during A/D conversion.

[2] Terminal block (European type)
Wiring of the voltage and current input
[3] Connector (PLC side)
Used to fix extension block on right side.
[4] DIN rail mounting hook
[5] Slide lock
Used to connect the FX3UC main unit extension block.
[6] Connector (Extension side)
Used to connect extension block on right side of this special block.
Remove this cover for connecting.
[7] Power connector (24V DC)
The connector for supplying 24V power supply to 4AD.
[8] Power crossover connector
Used to supply power supply to the extension block.

4. Installation

The 4AD can be installed on a DIN46277 rail (35 mm (1.38") wide).

INSTALLATION PRECAUTIONS ⚠WARNING

- Make sure to cut off all phases of the power supply externally before attempting installation or wiring work.
  Failure to do so may cause electric shock or damage to the product.

INSTALLATION PRECAUTIONS ⚠CAUTION

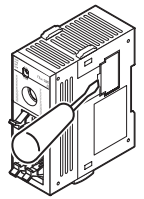
- Use screwdrivers carefully when performing installation work, thus avoiding accident or product damage.
- Use the product within the generic environment specifications described in PLC main unit manual (Hardware Edition).
  Never use the product in areas with excessive dust, oily smoke, conductive dusts, corrosive gas (salt air, Cl_2, H_2S, SO_2 or NO_2), flammable gas, vibration or impacts, or expose it to high temperature, condensation, or rain and wind.
  If the product is used in such conditions, electric shock, fire, malfunctions, deterioration or damage may occur.
- When drilling screw holes or wiring, make sure cutting or wire debris does not enter the ventilation slits.
  Failure to do so may cause fire, equipment failures or malfunctions.
- Connect FX3UC-4AD securely to their designated connectors.
  Loose connections may cause malfunctions.

Up to 8 units*1 can be connected to the FX3UC Series PLC.

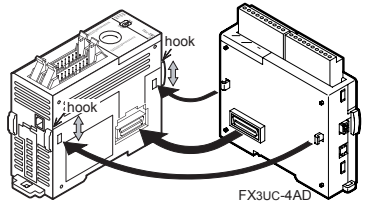
*1 Up to 7 units can be connected to the FX3UC-32MT-LT(-2) PLC.

4.1 Connection to the PLC

1) Turn off the power.
   Disconnect all the cables connected to the PLC, and demount the PLC from the DIN rail.
2) Remove the extension block connector cover on the main unit / extension block.

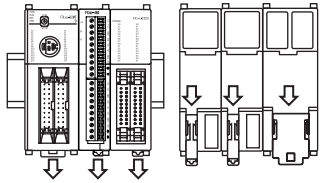


3) Slide the special block slide lock of the main unit / extension block.
4) The 4AD connector (PLC side) is connected to the main unit / extension block connector whose cover was previously removed.
   (see the following figure.)
5) Slide back the slide lock of the main unit / extension block to attach the 4AD.

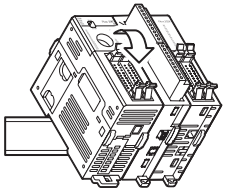


4.2 Installation In Enclosure

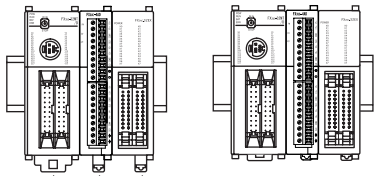
1) Push out all DIN rail mounting hooks.



2) Fit the upper edge of the DIN rail mounting groove onto the DIN rail.
   DIN46277 rail (35 mm (1.38") wide)



3) Lock the DIN rail mounting hooks while pressing the PLC against the DIN rail.



For installation/uninstallation, Refer to the FX3UC Series User's Manual - Hardware Edition.

5. Wiring (Power supply and analog input)

WIRING PRECAUTIONS ⚠WARNING

- Make sure to cut off all phases of the power supply externally before attempting installation or wiring work.
  Failure to do so may cause electric shock or damage to the product.

WIRING PRECAUTIONS ⚠CAUTION

- Make sure to observe the following precautions in order to prevent malfunctions under the influence of noise:
  1) Do not bundle the power line or twisted shielded cable together with or lay it close to the main circuit, high-voltage line or load line.
  Otherwise, noise disturbance and/or surge induction are likely to take place. As a guideline, lay the control line at least 100mm (3.94") or more away from the main circuit, high-voltage lines, or load line.
  2) Ground the twisted shield cable at one point on the PLC. However, do not use common grounding with heavy electrical systems.
- Make sure to properly wire to the European terminal board in accordance with the following precautions.
  Failure to do so may cause electric shock, equipment failures, a short-circuit, wire breakage, malfunctions, or damage to the product.
  - The disposal size of the cable end should follow the dimensions described in the manual.
  - Tightening torque should follow the specifications in the manual.
  - Twist the end of strand wire and make sure that there are no loose wires.
  - Do not solder-plate the electric wire ends.
  - Do not connect more than the specified number of wires or electric wires of unspecified size.
  - Affix the electric wires so that neither the terminal block nor the connected parts are directly stressed.

5.1 Wire and Terminal Tightening Torque

5.1.1 Cable

1) Applicable cable

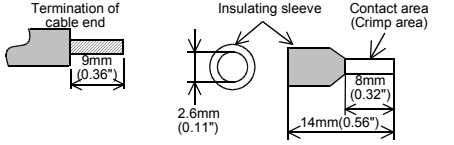
Type	Wire size
Single wire	0.3mm^2 to 0.5mm^2(AWG22 to 20)
Double wire	0.3mm^2(AWG22)*2

2) Termination

Strip the coating of strand wire and twist the cable core before connecting it, or strip the coating of single wire before connecting it. An alternative connection is to use a ferrule with insulating sleeve.

Manufacturer	Model	Pressure bonding tool
Phoenix Contact	AI 0.5-8WH	CRIMPFOX ZA 3 (or CRIMPFOX UD 6)

- Stranded wire/solid wire
- Bar terminal with insulating sleeve



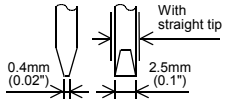
When using a stick terminal with an insulating sleeve, choose a wire with proper cable sheath referring to the above outside dimensions, otherwise the wire cannot be inserted easily.

5.1.2 Tightening Torque

Tightening torque should be between 0.22 and 0.25 N•m.
Do not tighten terminal screws with a torque exceeding the regulation torque. Failure to do so may cause equipment failures or malfunctions.

5.2 Tool

To tighten terminals, use a purchased small-sized screwdriver whose head is straight and is not widened as shown in the right figure.



Note:
If the diameter of screwdriver grip is too small, tightening torque will not be able to be achieved. Use the following recommended screwdriver or an appropriate replacement (grip diameter: approximately 25mm).

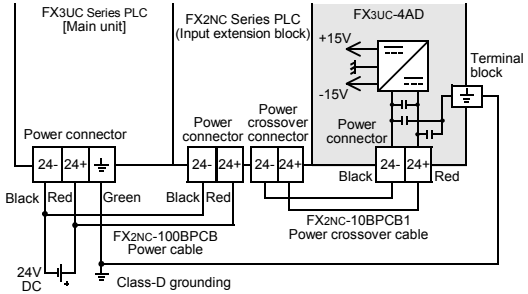
Manufacturer	Model
Phoenix Contact	SZS 0.4×2.5

5.3 Power supply wiring

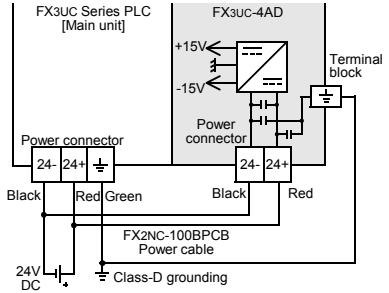
Supply the 24V DC power to 4AD via the power supply connector.

Model	Application
FX2NC-10BPCB1	Power crossover cable(offered as an accessory for the FX3UC-4AD)
FX2NC-100BPCB	Power cable(offered as an accessory for the FX3UC Series main unit)

1) Connection example with the power supply through crossover wiring to the FX2NC input extension block



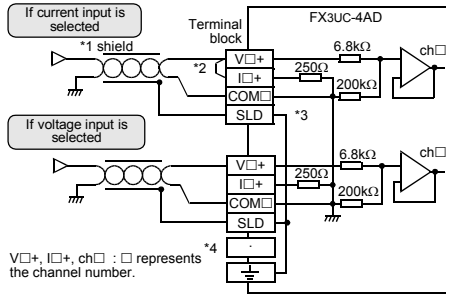
2) Connection example to the external power supply.



- Ground the "⏚" terminal to the Class - D grounding line (100 Ω or less) together with the ground terminal of the main unit.
- Remove the resin cover from the power crossover connector and perform crossover wiring to connect the power line from 4AD to a succeeding extension block.

5.4 Wiring of Analog Input

For the terminal layout, refer to Chapter 3



*1 Use the 2-core shielded twisted pair cable for the analog input lines, and separate the analog input lines from the other motive power lines or inductive lines.

*2 To use the current input, be sure to short circuit the line between the V□ + terminal and the I□ + terminal (□: channel number).

*3 The SLD and "⏚" terminals are connected to each other inside.

*4 Do not connect any lines to the "•" terminal.

6. Specifications

STARTUP AND MAINTENANCE PRECAUTIONS ⚠CAUTION

- Do not disassemble or modify the PLC.
  Doing so may cause fire, equipment failures, or malfunctions.
  * For repair, contact your local Mitsubishi Electric distributor.
- Do not drop the product or exert strong impact to it.
  Doing so may cause damage.

DISPOSAL PRECAUTIONS ⚠CAUTION

- Please contact a certified electronic waste disposal company for the environmentally safe recycling and disposal of your device.

TRANSPORT AND STORAGE PRECAUTIONS ⚠CAUTION

- The product is a precision instrument. During transportation, avoid any impacts.
  Failure to do so may cause failures in the product.
  After transportation, verify the operations of the product.

6.1 Applicable PLC

Applicable PLC	FX3UC Series PLC (Ver.1.30 or later) From the production manufactured in August, 2004 with SER No.48****

6.2 General Specifications

The general specifications are equivalent to the PLC main unit.
(For general specifications, refer to the manual of the PLC main unit.)

6.3 Power Supply Specifications

Item	Specifications
A/D conversion circuit driving power	24V DC ±10%, 80mA (24V DC power is supplied from the power connector.)
Interface driving power	5V DC, 100mA (5V DC power is supplied from the internal power supply of main unit, it is not necessary to prepare power supply)

6.4 Performance Specifications

Item	Specifications	
	Voltage input	Current input
Analog input range	-10 to +10V DC (Input resistance: 200 kΩ)	-20 to +20mA, 4 to 20mA DC (Input resistance: 250 Ω)
Offset*1	-10 to +9V	-20 to +17mA
Gain*1	10V or less, Gain - Offset≥1V	30mA or less, Gain - Offset≥3mA
Maximum absolute input	±15V	±30mA
Digital output	Effective numeric value 15bits + Sign 1bit	Effective numeric value 14bits + Sign 1bit
Resolution*2	0.32mV (20V×1/64000) 2.50mV (20V×1/8000)	1.25mA (40mA×1/32000) 5.00μA (40mA×1/8000)
Total accuracy	• ±0.3% (±60mV) for full scale of 20V (when ambient temperature is 25°C±5°C) • ±0.5% (±100mV) for full scale of 20V (when ambient temperature is 0°C to 55°C)	• ±0.5% (±200μA) for full scale of 40mA (when ambient temperature is 25°C±5°C and a current of -20 mA to +20 mA is input) Same when input is 4mA to 20mA • ±1.0% (±400μA) for full scale of 40mA (when ambient temperature is 25°C±5°C and a current of -20 mA to +20 mA is input) Same when input is 4mA to 20mA
A/D conversion time	500μs × number of selected channels (If channels use the digital filter(s): 5ms × number of selected channels)	
Insulation method	• The photo-coupler insulates the analog input area from the PLC. • The DC-DC converter insulates the analog input area from the power supply unit. • Channels are not insulated from each other.	
Occupied points	8 point (Count either the input or output points of the PLC.)	

*1 Change the offset and gain values to change the input characteristics. However, the resolution doesn't change even when the offset and gain values change.
In the direct indication mode, however, the offset/gain cannot be adjusted.

*2 The resolution depend on the input mode.

6.5 Input characteristics

For the 4AD, the nine kinds of input characteristics are provided for each input mode.
For the details of the input character, refer to the following.

Input mode Set value	Input mode	Analog input range	Digital output range	Resolution
0	Voltage input mode	-10 to +10V	-32000 to +32000	0.32mV
1	Voltage input mode	-10 to +10V	-4000 to +4000	2.50mV
2	Voltage input mode Analog value direct indication	-10 to +10V	-10000 to +10000	1.00mV
3	Current input mode	4 to 20mA	0 to 16000	1.25μA
4	Current input mode	4 to 20mA	0 to 4000	5.00μA
5	Current input mode Analog value direct indication	4 to 20mA	4000 to 20000	1.25μA
6	Current input mode	-20 to +20mA	-16000 to +16000	1.25μA
7	Current input mode	-20 to +20mA	-4000 to +4000	5.00μA
8	Current input mode Analog value direct indication	-20 to +20mA	-20000 to +20000	1.25μA
9 to E	Not used.			
F	No channels used			

This manual confers no industrial property rights or any rights of any other kind, nor does it confer any patent licenses. Mitsubishi Electric Corporation cannot be held responsible for any problems involving industrial property rights which may occur as a result of using the contents noted in this manual.

Warranty

Mitsubishi will not be held liable for damage caused by factors found not to be the cause of Mitsubishi; opportunity loss or lost profits caused by faults in the Mitsubishi products; damage, secondary damage, accident compensation caused by special factors unpredictable by Mitsubishi; damages to products other than Mitsubishi products; and to other duties.

⚠ For safe use

- This product has been manufactured as a general-purpose part for general industries, and has not been designed or manufactured to be incorporated in a device or system used in purposes related to human life.
- Before using the product for special purposes such as nuclear power, electric power, aerospace, medicine or passenger movement vehicles, consult with Mitsubishi Electric.
- This product has been manufactured under strict quality control. However when installing the product where major accidents or losses could occur if the product fails, install appropriate backup or failsafe functions in the system.

MITSUBISHI ELECTRIC CORPORATION
HEAD OFFICE : TOKYO BUILDING, 2-7-3 MARUNOUCHI, CHIYODA-KU, TOKYO 100-8310, JAPAN

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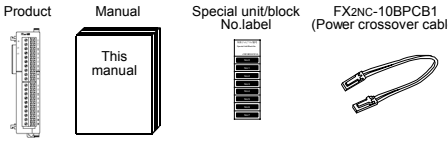
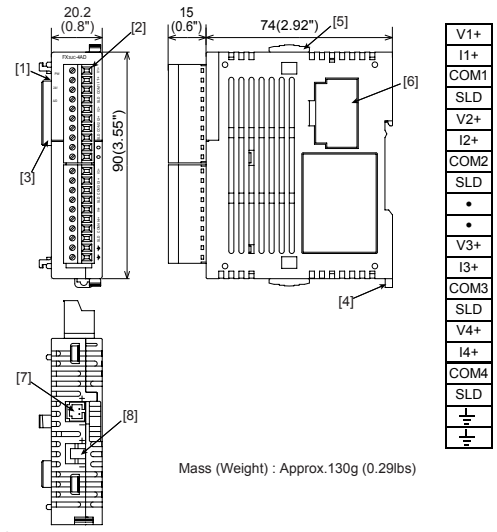


3. External Dimensions, Part Names, and Terminal Layout



Mass (Weight) : Approx.130g (0.29lbs)

[1] Status indicator LED
- PW (Green): Lit while 5 V power is normally supplied from PLC.
- 24V (Red): Lit while 24V power is normally supplied from power supply.
- A/D (Red): Flashes during A/D conversion.

[2] Terminal block (European type)
Wiring of the voltage and current input
[3] Connector (PLC side)
Used to fix extension block on right side.
[4] DIN rail mounting hook
[5] Slide lock
Used to connect the FX3UC main unit extension block.
[6] Connector (Extension side)
Used to connect extension block on right side of this special block.
Remove this cover for connecting.
[7] Power connector (24V DC)
The connector for supplying 24V power supply to 4AD.
[8] Power crossover connector
Used to supply power supply to the extension block.

4. Installation

The 4AD can be installed on a DIN46277 rail (35 mm (1.38") wide).

INSTALLATION PRECAUTIONS ⚠WARNING

- Make sure to cut off all phases of the power supply externally before attempting installation or wiring work.
  Failure to do so may cause electric shock or damage to the product.

INSTALLATION PRECAUTIONS ⚠CAUTION

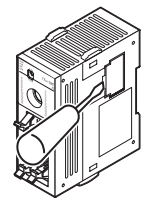
- Use screwdrivers carefully when performing installation work, thus avoiding accident or product damage.
- Use the product within the generic environment specifications described in PLC main unit manual (Hardware Edition).
  Never use the product in areas with excessive dust, oily smoke, conductive dusts, corrosive gas (salt air, Cl_2, H_2S, SO_2 or NO_2), flammable gas, vibration or impacts, or expose it to high temperature, condensation, or rain and wind.
  If the product is used in such conditions, electric shock, fire, malfunctions, deterioration or damage may occur.
- When drilling screw holes or wiring, make sure cutting or wire debris does not enter the ventilation slits.
  Failure to do so may cause fire, equipment failures or malfunctions.
- Connect FX3UC-4AD securely to their designated connectors.
  Loose connections may cause malfunctions.

Up to 8 units*1 can be connected to the FX3UC Series PLC.

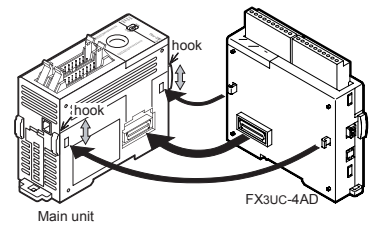
*1 Up to 7 units can be connected to the FX3UC-32MT-LT(-2) PLC.

4.1 Connection to the PLC

1) Turn off the power.
   Disconnect all the cables connected to the PLC, and demount the PLC from the DIN rail.
2) Remove the extension block connector cover on the main unit / extension block.

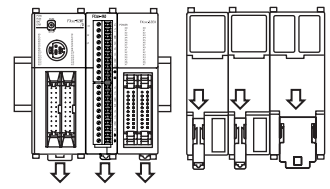


3) Slide the special block slide lock of the main unit / extension block.
4) The 4AD connector (PLC side) is connected to the main unit / extension block connector whose cover was previously removed.
   (see the following figure.)
5) Slide back the slide lock of the main unit / extension block to attach the 4AD.

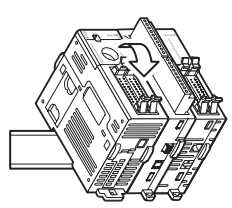


4.2 Installation In Enclosure

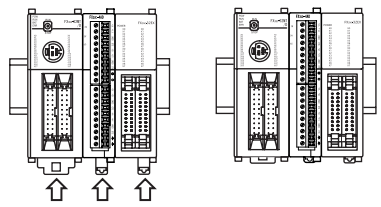
1) Push out all DIN rail mounting hooks.



2) Fit the upper edge of the DIN rail mounting groove onto the DIN rail.
   DIN46277 rail (35 mm (1.38") wide)



3) Lock the DIN rail mounting hooks while pressing the PLC against the DIN rail.



For installation/uninstallation, Refer to the FX3UC Series User's Manual - Hardware Edition.

5. Wiring (Power supply and analog input)

WIRING PRECAUTIONS ⚠WARNING

- Make sure to cut off all phases of the power supply externally before attempting installation or wiring work.
  Failure to do so may cause electric shock or damage to the product.

WIRING PRECAUTIONS ⚠CAUTION

- Make sure to observe the following precautions in order to prevent malfunctions under the influence of noise:
  1) Do not bundle the power line or twisted shielded cable together with or lay it close to the main circuit, high-voltage line or load line.
     Otherwise, noise disturbance and/or surge induction are likely to take place. As a guideline, lay the control line at least 100mm (3.94") or more away from the main circuit, high-voltage lines, or load line.
  2) Ground the twisted shield cable at one point on the PLC. However, do not use common grounding with heavy electrical systems.
- Make sure to properly wire to the European terminal board in accordance with the following precautions.
  Failure to do so may cause electric shock, equipment failures, a short-circuit, wire breakage, malfunctions, or damage to the product.
  - The disposal size of the cable end should follow the dimensions described in the manual.
  - Tightening torque should follow the specifications in the manual.
  - Twist the end of strand wire and make sure that there are no loose wires.
  - Do not solder-plate the electric wire ends.
  - Do not connect more than the specified number of wires or electric wires of unspecified size.
  - Affix the electric wires so that neither the terminal block nor the connected parts are directly stressed.

5.1 Wire and Terminal Tightening Torque

5.1.1 Cable

1) Applicable cable

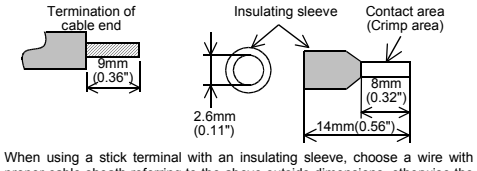
Type	Wire size
Single wire	0.3mm² to 0.5mm²(AWG22 to 20)
Double wire	0.3mm²(AWG22)*2

2) Termination

Strip the coating of strand wire and twist the cable core before connecting it, or strip the coating of single wire before connecting it. An alternative connection is to use a ferrule with insulating sleeve.

Manufacturer	Model	Pressure bonding tool
Phoenix Contact	AI 0.5-8WH	CRIMPFOX ZA 3 (or CRIMPFOX UD 6)

- Stranded wire/solid wire
- Bar terminal with insulating sleeve



When using a stick terminal with an insulating sleeve, choose a wire with proper cable sheath referring to the above outside dimensions, otherwise the wire cannot be inserted easily.

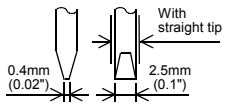
5.1.2 Tightening Torque

Tightening torque should be between 0.22 and 0.25 N•m.
Do not tighten terminal screws with a torque exceeding the regulation torque. Failure to do so may cause equipment failures or malfunctions.

5.2 Tool

To tighten terminals, use a purchased small-sized screwdriver whose head is straight and is not widened as shown in the right figure.

Note:
If the diameter of screwdriver grip is too small, tightening torque will not be able to be achieved. Use the following recommended screwdriver or an appropriate replacement (grip diameter: approximately 25mm).



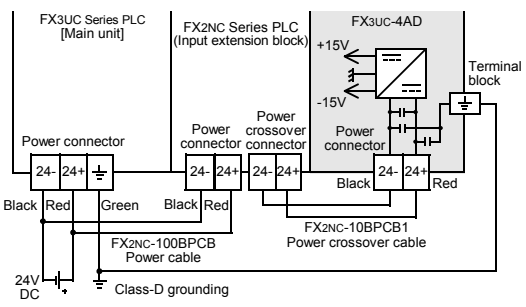
Manufacturer	Model
Phoenix Contact	SZS 0.4×2.5

5.3 Power supply wiring

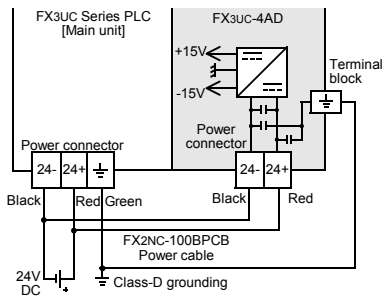
Supply the 24V DC power to 4AD via the power supply connector.

Model	Application
FX2NC-10BPCB1	Power crossover cable(offered as an accessory for the FX3UC-4AD)
FX2NC-100BPCB	Power cable(offered as an accessory for the FX3UC Series main unit)

1) Connection example with the power supply through crossover wiring to the FX2NC input extension block



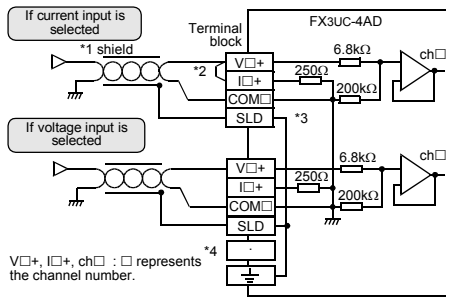
2) Connection example to the external power supply.



- Ground the "⏚" terminal to the Class - D grounding line (100 Ω or less) together with the ground terminal of the main unit.
- Remove the resin cover from the power crossover connector and perform crossover wiring to connect the power line from 4AD to a succeeding extension block.

5.4 Wiring of Analog Input

For the terminal layout, refer to Chapter 3



*1 Use the 2-core shielded twisted pair cable for the analog input lines, and separate the analog input lines from the other motive power lines or inductive lines.

*2 To use the current input, be sure to short circuit the line between the V□ + terminal and the I□ + terminal (□: channel number).

*3 The SLD and "⏚" terminals are connected to each other inside.

*4 Do not connect any lines to the "•" terminal.

6. Specifications

STARTUP AND MAINTENANCE PRECAUTIONS ⚠CAUTION

- Do not disassemble or modify the PLC.
  Doing so may cause fire, equipment failures, or malfunctions.
  * For repair, contact your local Mitsubishi Electric distributor.
- Do not drop the product or exert strong impact to it.
  Doing so may cause damage.

DISPOSAL PRECAUTIONS ⚠CAUTION

- Please contact a certified electronic waste disposal company for the environmentally safe recycling and disposal of your device.

TRANSPORT AND STORAGE PRECAUTIONS ⚠CAUTION

- The product is a precision instrument. During transportation, avoid any impacts.
  Failure to do so may cause failures in the product.
  After transportation, verify the operations of the product.

6.1 Applicable PLC

Applicable PLC	FX3UC Series PLC (Ver.1.30 or later) From the production manufactured in August, 2004 with SER No.48****

6.2 General Specifications

The general specifications are equivalent to the PLC main unit.
(For general specifications, refer to the manual of the PLC main unit.)

6.3 Power Supply Specifications

Item	Specifications
A/D conversion circuit driving power	24V DC ±10%, 80mA (24V DC power is supplied from the power connector.)
Interface driving power	5V DC, 100mA (5V DC power is supplied from the internal power supply of main unit, it is not necessary to prepare power supply)

6.4 Performance Specifications

Item	Specifications	
	Voltage input	Current input
Analog input range	-10 to +10V DC (Input resistance: 200 kΩ)	-20 to +20mA, 4 to 20mA DC (Input resistance: 250 Ω)
Offset*1	-10 to +9V	-20 to +17mA
Gain*1	10V or less, Gain - Offset≥1V	30mA or less, Gain - Offset≥3mA
Maximum absolute input	±15V	±30mA
Digital output	Effective numeric value 15bits + Sign 1bit	Effective numeric value 14bits + Sign 1bit
Resolution*2	0.32mV (20V×1/64000) 2.50mV (20V×1/8000)	1.25mA (40mA×1/32000) 5.00μA (40mA×1/8000)
Total accuracy	• ±0.3% (±60mV) for full scale of 20V (when ambient temperature is 25°C±5°C) • ±0.5% (±100mV) for full scale of 20V (when ambient temperature is 0°C to 55°C)	• ±0.5% (±200μA) for full scale of 40mA (when ambient temperature is 25°C±5°C and a current of -20 mA to +20 mA is input) Same when input is 4mA to 20mA • ±1.0% (±400μA) for full scale of 40mA (when ambient temperature is 25°C±5°C and a current of -20 mA to +20 mA is input) Same when input is 4mA to 20mA
A/D conversion time	500μs × number of selected channels (If channels use the digital filter(s): 5ms × number of selected channels)	
Insulation method	• The photo-coupler insulates the analog input area from the PLC. • The DC-DC converter insulates the analog input area from the power supply unit. • Channels are not insulated from each other.	
Occupied points	8 point (Count either the input or output points of the PLC.)	

*1 Change the offset and gain values to change the input characteristics. However, the resolution doesn't change even when the offset and gain values change.
In the direct indication mode, however, the offset/gain cannot be adjusted.

*2 The resolution depend on the input mode.

6.5 Input characteristics

For the 4AD, the nine kinds of input characteristics are provided for each input mode.
For the details of the input character, refer to the following.

Input mode Set value	Input mode	Analog input range	Digital output range	Resolution
0	Voltage input mode	-10 to +10V	-32000 to +32000	0.32mV
1	Voltage input mode	-10 to +10V	-4000 to +4000	2.50mV
2	Voltage input mode Analog value direct indication	-10 to +10V	-10000 to +10000	1.00mV
3	Current input mode	4 to 20mA	0 to 16000	1.25μA
4	Current input mode	4 to 20mA	0 to 4000	5.00μA
5	Current input mode Analog value direct indication	4 to 20mA	4000 to 20000	1.25μA
6	Current input mode	-20 to +20mA	-16000 to +16000	1.25μA
7	Current input mode	-20 to +20mA	-4000 to +4000	5.00μA
8	Current input mode Analog value direct indication	-20 to +20mA	-20000 to +20000	1.25μA
9 to E	Not used.			
F	No channels used			

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⚠ For safe use

- This product has been manufactured as a general-purpose part for general industries, and has not been designed or manufactured to be incorporated in a device or system used in purposes related to human life.
- Before using the product for special purposes such as nuclear power, electric power, aerospace, medicine or passenger movement vehicles, consult with Mitsubishi Electric.
- This product has been manufactured under strict quality control. However when installing the product where major accidents or losses could occur if the product fails, install appropriate backup or failsafe functions in the system.

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